

WANLASS R-3200

VOLTAGE REGULATORS

15-30-60-90-120 and 250 VA — 100-130 volts

for Original Equipment Applications

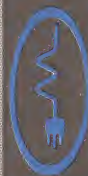


R-3200/60 Actual Size
Patents Pending

Now...A NEW MULTI-FREQUENCY LINE, LOAD AND POWER FACTOR REGULATOR WITH MICROSECOND RESPONSE

The new Wanlass R-3200 voltage regulators are designed specifically to be used in a wide variety of electronic instruments and equipments. The following important features and benefits are stressed in their design and precision manufacture:

- Economy • Small Size • Light Weight • 47-63 cycle operation • 1% line and load regulation
- Power factor insensitive • Current overload protection • No phase shift • Microsecond response
- Efficiency—up to 10% more in rated tests • All solid state • Optional 400 cycle operation



HERE ARE SOME OF THE OUTSTANDING CHARACTERISTICS OF THE NEW **R-3200** VOLTAGE REGULATORS

OPERATION AND WAVEFORM

The R-3200 is both a line and load regulator. Regulation is achieved by "peak clipping" techniques as shown in Figure 1. The unretouched photograph shown was taken from a dual beam oscilloscope having one trace connected to the input voltage to the regulator and the other trace connected to the output voltage from the regulator. The two traces are superimposed to show that input and output waveforms are identical except for the "peak clipping" of the output wave. This output waveform is ideal as an input to a dc power supply because it greatly simplifies the filtering problem. In addition, since it is sinusoidal, the output waveform does not cause overheating of motors as is the case with a square wave output.

REGULATION

The R-3200 holds peak output voltage constant under varying conditions of line, load, frequency and power factor. The regulation achieved, as shown in Figures 2 and 3, may be summarized as follows:

Load Regulation (0 - full load)	$\pm 1\%$ Peak	$\pm 1\%$ RMS (typically)
Line Regulation ($\pm 10\%$)	$\pm 1\%$ Peak	$\pm 3\%$ RMS (typically)

The R-3200 is normally set to deliver 115 v (RMS) with input voltage of 115 v (RMS). Other factory settings are possible.

FREQUENCY AND POWER FACTOR

The R-3200 is relatively insensitive to frequency and power factor. The only limitation to its frequency of operation is the transformer design which is normally a 60 cycle unit. For use at other frequencies the volt ampere rating of the unit should be scaled accordingly (at 50 cycles, derate unit by 15%). As shown in Figure 4, the R-3200 operates over both capacitive and inductive power factor loadings with good resultant regulation.

PHASE SHIFT

An insignificant amount of phase shift is introduced by the R-3200 under varying conditions of line, load and load power factor. This is shown graphically in Figures 6 through 10

RESPONSE

Response time of the R-3200 is less than 50 microseconds. The unretouched oscilloscope photograph shown in Figure 5 illustrates how this fast response characteristic provides the R-3200 with a significant line noise suppression capability.

As shown in the upper trace, a 25 volt step change has been induced in the input waveform, with the resultant change in the output waveform as shown in the lower trace. A study of such oscilloscope photographs (taken at higher sweep rates) verifies the remarkable 50 microsecond response specification of the R-3200 units for both positive and negative step changes in line voltage.

TEMPERATURE

The R-3200 has an ambient range of 0° to 50°C, with a temperature coefficient of 0.025% per degree centigrade. Stability of the unit is 1% over an eight-hour period after warm up.

SIZE AND WEIGHT

Because of its solid state design, the R-3200 is characteristically from $\frac{1}{3}$ to $\frac{1}{2}$ the size and weight of competitively priced units currently on the market.

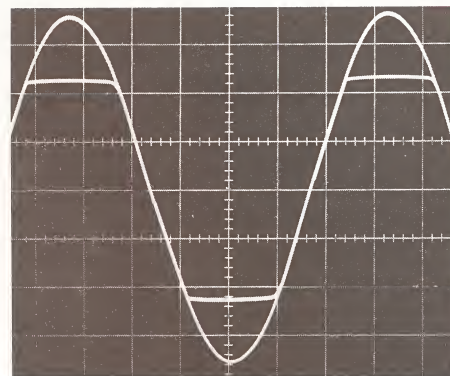


Fig. 1 R-3200 Input Trace Superimposed Over Output Trace. Note "Peak Clipping" of Output Waveform.

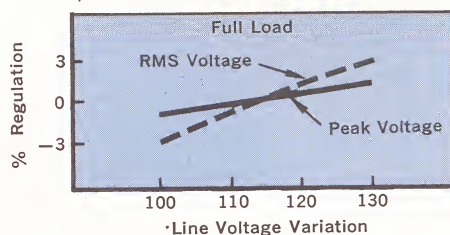


Fig. 2. Typical Line Regulation Characteristics

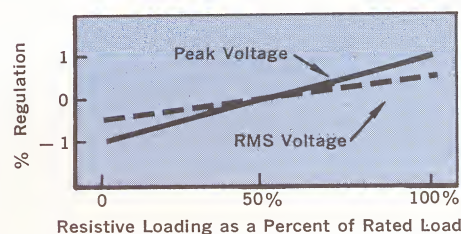


Fig. 3. Typical Load Regulation Characteristics

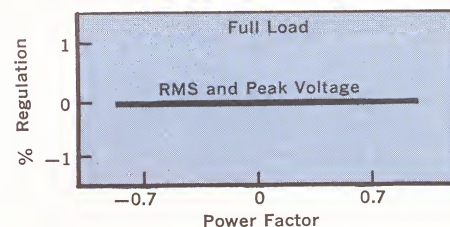


Fig. 4. Typical Power Factor Loading Characteristics

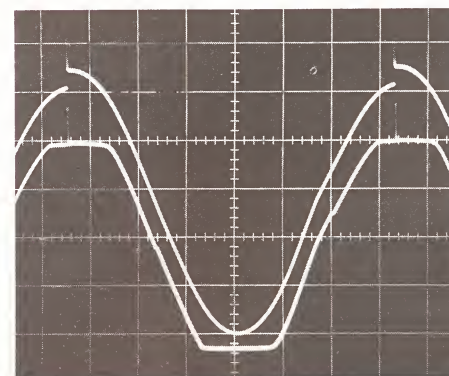


Fig. 5. Upper trace — Input voltage to the R-3200/60
Lower trace — Output voltage waveform from the R-3200/60 operating under full rated load conditions (resistive)

COMPARE

THE OUTSTANDING CHARACTERISTICS OF THE WANLASS R-3200 SERIES WITH A TYPICAL 60 VA FERRORESONANT TRANSFORMER CURRENTLY ON THE MARKET

The comparison chart and the untouched photographs taken from a dual beam oscilloscope (Figures 6 through 10) clearly show the outstanding characteristics and product advantages of the Wanlass R-3200/60 regulator as compared to a typical 60 volt ampere ferroresonant transformer. In each test shown, physical and electrical test conditions were identical for each unit. Figures 6, 7 and 8 graphically illustrate the comparative waveform distortion and regulating action of the two units as a function of line input voltage.

Note in Figures 7 and 9 a comparison of the relative waveform distortion and phase shift introduced by the two units as load is varied under constant input line voltage conditions. Also compare in Figures 7 and 10 the waveform distortion, phase shift, and regulation achieved by the two test units under power factor loading.

TYPICAL PRODUCT COMPARISON CHART*

	R-3200/60 60 va Unit	Typical 60 va Ferroresonant Transformer
Price	\$20.00	\$21.00
Line Regulation	$\pm 1\%$	$\pm 1\%$
Load Regulation	$\pm 1\%$	—
Frequency	47-63 cps	60 cps
Power Factor	Insensitive up to ± 0.7	1.0
Phase Shift	no	yes
Response	50 microseconds	25,000 microseconds
Weight	2.5 lbs.	8 lbs.
Size	3" x 3 3/4" x 4"	3" x 4" x 5" **
Units to be mounted	1	2

* R-3200/60 is the unit shown actual size on the front page. The oscilloscope photographs reproduced below show further product comparisons.

** Dimensions do not include separate capacitor.

WANLASS R-3200

TYPICAL 60 VA FERRORESONANT TRANSFORMER

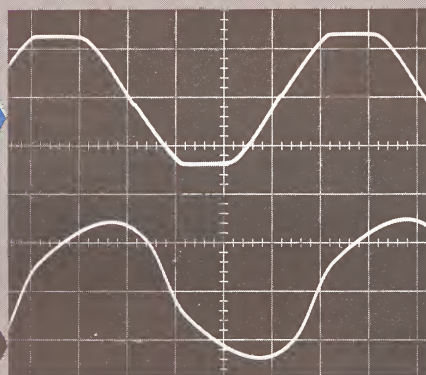


Fig. 6. Input voltage 100 v (RMS)
Load: Full rated load (resistive)

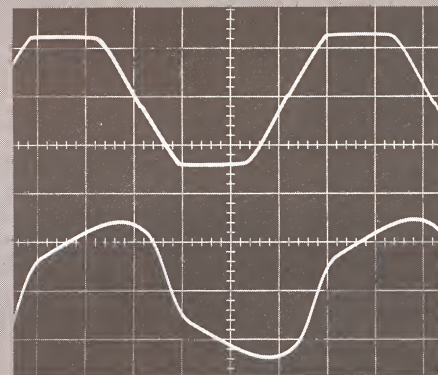


Fig. 7. Input voltage 115 v (RMS)
Load: Full rated load (resistive)

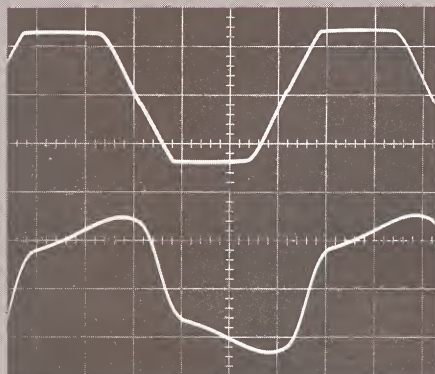


Fig. 8. Input voltage 130 v (RMS)
Load: Full rated load (resistive)

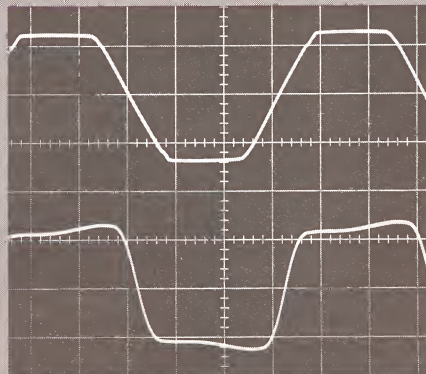


Fig. 9. Input voltage 115 v (RMS)
Load: No load

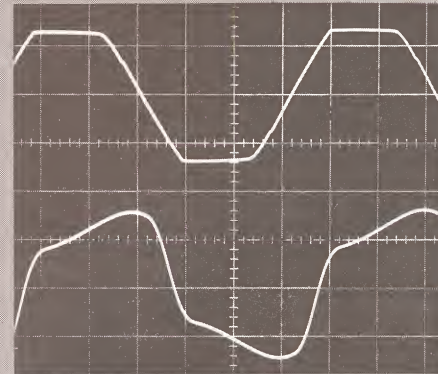


Fig. 10. Input voltage 115 v (RMS)
Load: Full rated load
Power Factor: -0.8

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Burlington, N. C. 27215 (919) 227-7916

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Salt Lake City, Utah 84117 (801) 278-4465

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Harris-Hanson
2814 S. Brentwood Boulevard
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CHECK THESE APPLICATIONS FOR WANLASS R-3200 VOLTAGE REGULATORS

From the standpoint of cost, performance, economy of operation, and feature-by-feature comparison with other competitively priced units on the market, Wanlass R-3200 voltage regulators are ideal for all original equipment applications now using constant voltage ferroresonant transformers. The superior features and performance of the R-3200 also make possible many new applications, some of which are shown below.

Feature	Application
Frequency Insensitivity	Regulation of the output of auxiliary power plants Interchangeable 50-60 cycle operation 350-450 cycle operation
Power Factor Insensitivity	Operation of motors and other lagging power factor loads Operation of leading power factor loads
Small Size and Light Weight	Small instruments Portable equipment Airborne and spaceborne equipment
Fast Response	Line noise filtering Regulation for rapid load changes
"Peak Clipped" Sinusoidal Waveform	Pre-regulation for dc power supplies Operation of motors
No Phase Shift	Operation of phase sensitive triggering circuits

WANLASS VOLTAGE REGULATOR PRICES*

VA	47-63 CPS NON-ISOLATED	47-63 CPS ISOLATED	400 CPS NON-ISOLATED	400 CPS ISOLATED
15	R-3200/15 \$14.00	R-3200/15-I \$16.00	R-3200/15-4 \$28.00	R-3200/15-4I \$30.00
30	R-3200/30 \$15.00	R-3200/30-I \$17.00	R-3200/30-4 \$32.00	R-3200/30-4I \$35.00
60	R-3200/60 \$20.00	R-3200/60-I \$23.00	R-3200/60-4 \$35.00	R-3200/60-4I \$38.00
90	R-3200/90 \$24.00	R-3200/90-I \$28.00	R-3200/90-4 \$42.00	R-3200/90-4I \$46.00
120	R-3201 \$28.00	R-3201-I \$32.00	R-3201-4 \$49.00	R-3201-4I \$54.00
250	R-3202 \$48.00	R-3202-I \$53.00	R-3202-4 \$67.00	R-3202-4I \$75.00

*F.O.B. Santa Ana. Prices subject to change without notice. Taxes additional.

For more information about Wanlass R-3200 voltage regulators, contact your nearest Wanlass National Sales Office or Representative. A skilled sales engineer will be pleased to counsel you on your voltage regulation problems and applications.

WANLASS ELECTRIC CO.



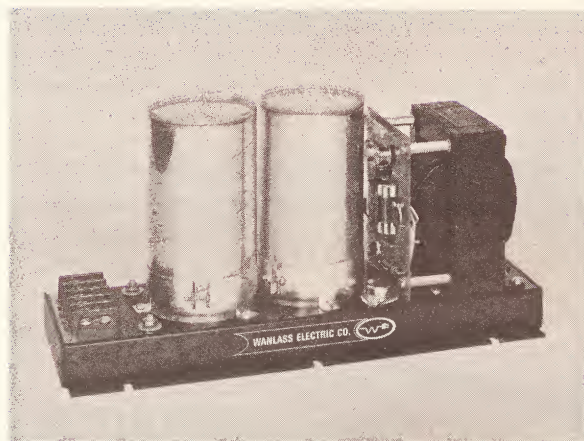
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TELEPHONE: (714) 546-8990

WANLASS ELECTRIC CO.



LX POWER SUPPLY

**120-LX
POWER
SUPPLY**



The Wanlass LX Power Supply Series is the long awaited replacement for the economical ferroresonant supply. Competitively priced, the LX Series features a 1% load regulation characteristic that has never been attainable with ferroresonant supplies. This is particularly important since microelectronic circuitry with its requirement for large currents at low voltages (4 to 5 vdc) has accentuated this load regulation problem. See the reverse side of this sheet for a competitive analysis of a Wanlass LX Power Supply and a typical ferroresonant supply.

- $\pm 1\%$ Line Regulation
- $\pm 1\%$ Load Regulation
- Less than 150 mv. Ripple
- 50 μ sec response to line variations
- Frequency insensitive (47-63 Cps)
- Adjustable Output voltage

- Better efficiency (no significant pre-loading)
- Crowbar over voltage protection (Optional Feature — \$25.00)
- 13 Standard sizes including 4, 4.5 & 5 volts
- Economical Open Frame Construction
- Immediate Availability

PRICES AND SPECIFICATIONS*

UNIT	VOLTS**	AMPERES	UNIT	VOLTS**	AMPERES
120-15LX 4	4.0 $\pm 3\%$	0-15	120-3.5LX36	36 $\pm 3\%$	0-3.5
120-15LX 4.5	4.5 $\pm 3\%$	0-15	120-2.5LX48	48 $\pm 3\%$	0-2.5
120-15LX 5	5.0 $\pm 3\%$	0-15	120-2 LX60	60 $\pm 3\%$	0-2
120-15LX 6	6.3 $\pm 3\%$	0-15	120-1 LX120	120 $\pm 3\%$	0-1
120-10LX12	12 $\pm 3\%$	0-10	120-0.7LX180	180 $\pm 3\%$	0-0.7
120- 7LX18	18 $\pm 3\%$	0- 7	120-0.5LX240	240 $\pm 3\%$	0-0.5
120- 5LX24	24 $\pm 3\%$	0- 5			

Custom Supplies? Wanlass Electric would be pleased to quote on your custom power supply requirement. Write today — Wanlass is emphasizing OEM accounts.

* All units priced at \$125.00 F.O.B. Santa Ana. Prices and Specifications subject to change without notice. Taxes additional

** All output voltages are adjustable $\pm 3\%$ as indicated.

*F.O.B. SANTA ANA, PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE, TAXES ADDITIONAL.

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PATENTS PENDING

TYPICAL TECHNICAL COMPARISON

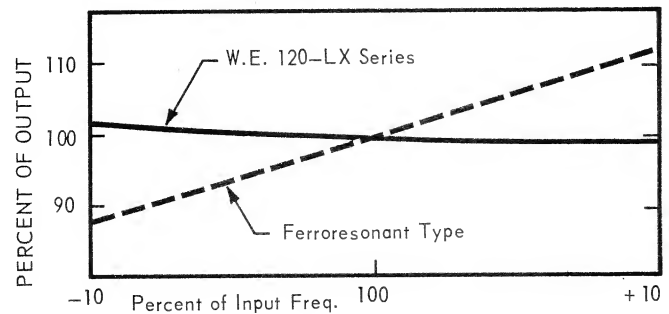
	LX UNIT	FERRORESONANT UNIT
OUTPUT VOLTS	6.3	6.3
OUTPUT AMPERES	0-15	0-15
LINE REGULATION	$\pm 1\%$	$\pm 1\%$
LOAD REGULATION	$\pm 1\%$	$\pm 6\%$
INPUT FREQUENCY REGULATION	$\pm 2\%$	$\pm 12\%$
RIPPLE *	150 mv (RMS)	400 mv (RMS)
LINE TRANS. RESPONSE	50 MICRO SEC.	25,000 MICRO SEC.
ENERGY STORAGE **	5.6 JOULES	1.75 JOULES
VOLTAGE ADJUSTIBILITY	$\pm 3\%$	NONE
WEIGHT	14 LBS.	14.5 LBS.

*For 6.3V Output. Less for higher voltage units.

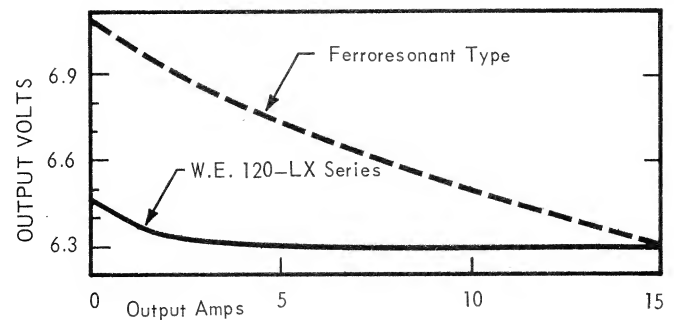
For Reduced Ripple requirements refer to FLX Power Supply Series (15 mv RMS for 6.3V Regulator).

**Proportional to Output Voltage.

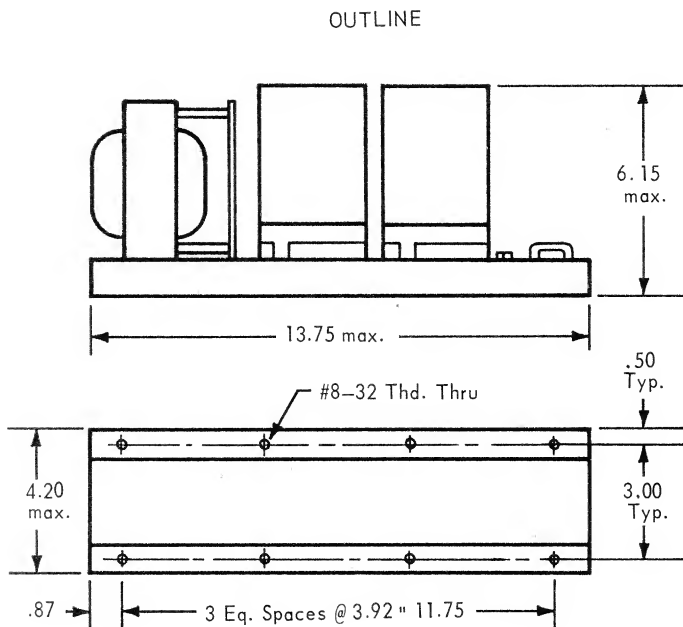
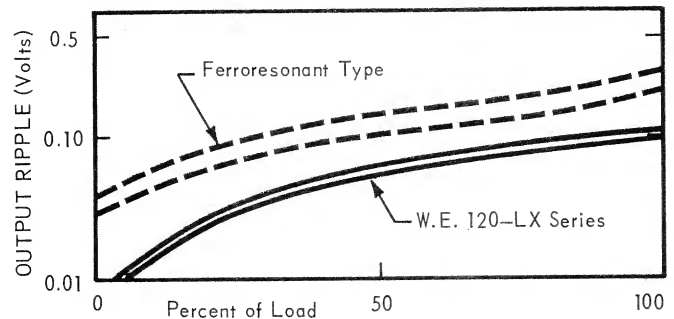
INPUT FREQUENCY VERSUS OUTPUT VOLTAGE



LOAD REGULATION



RIPPLE CHARACTERISTICS



WANLASS ELECTRIC CO.



R-1300

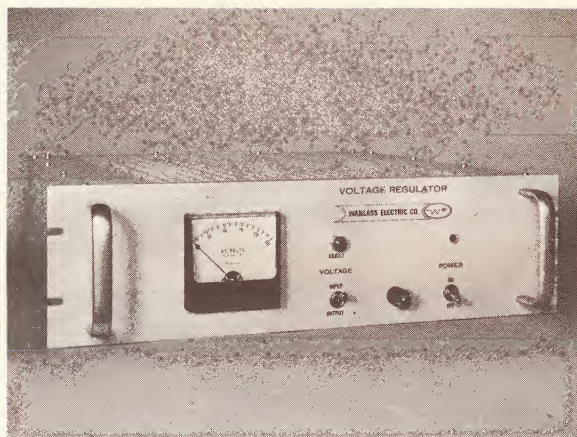
R-1300 VOLTAGE REGULATOR SERIES POWER CONVERSION EQUIPMENT

0.1% RMS LINE-LOAD REGULATION
DYNAMICALLY FILTERED

0.1% Voltage Regulators

WITH EXCLUSIVE WANLASS
DYNAMIC FILTER

95-130 VOLTS
50 OR 60 CPS



The new Wanlass R-1300 Series is the answer to the light weight, high performance voltage regulator requirement. Incorporating the exclusive Wanlass Dynamic Filter as an optional feature, the R-1300 is the only voltage regulator available that has the compactness and efficiency of SCR techniques without the usual adverse output line transient problems. All adverse output line transients are eliminated.

The R-1300 units use high speed SCR techniques along with RMS sensors and closed loop control to maintain the output voltage to within $\pm 0.1\%$. Output is carefully filtered to keep the distortion to less than 3%. Adjustability of output, remote sensing, and programmability are other standard features.

SPECIFICATIONS

- | | |
|-----------------------------|--|
| ■ Line Regulation | 95-130 volts input |
| ■ Load Regulation | $\pm 0.1\%$ for $\pm 10\%$ input variation |
| ■ Dynamic Filter | $\pm 0.1\%$ for zero to full load |
| ■ Distortion | No residual SCR or overvoltage transients |
| ■ Response | Less than 3% |
| | Regulator - 30 milliseconds |
| | Dynamic Filter - less than 1 microsecond |
| ■ Output Voltage Adjustment | 110-120 volts |
| ■ Frequency | 50 or 60 cps |
| ■ Efficiency | Typically 90% (full load) |
| ■ Operating Temperatures | 0-50°C |
| ■ Temperature Coefficient | Less than 0.025%/°C |
| ■ Stability | 0.05% over 8 hours (after warm-up) |
| ■ Power Factor | Typically 1.0 - 0.7 (lagging) |
| ■ Remote Sensing | |
| ■ Current Limiting | Standard feature |
| ■ Rack and Case Mounted | Standard 19" rack mount |

*F.O.B. SANTA ANA, PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE, TAXES ADDITIONAL.

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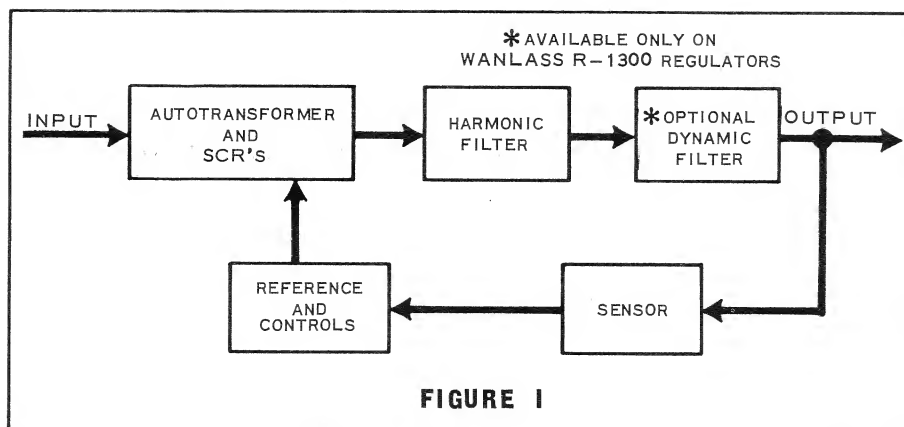


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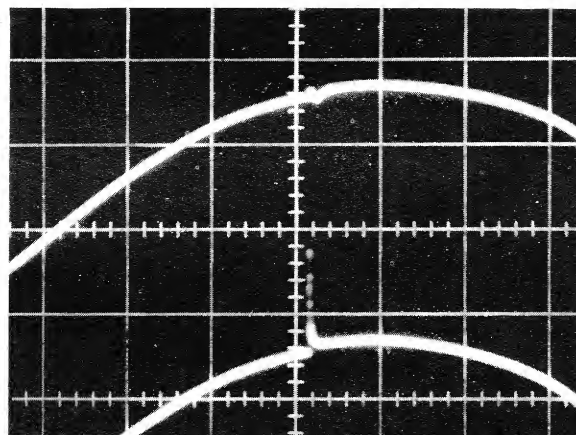
PATENTS PENDING

OPERATION:

Figure 1 summarizes the operation of the unit. The control of the firing angle of the SCR's providing the basis for regulation.



DYNAMIC FILTER: This is the unique optional feature which makes Wanlass SCR voltage regulators "safe." In spite of the inherent precision of SCR regulators, their relatively slow response time (30 milliseconds) makes them susceptible to two problems: (1) typically high voltage "spikes" (e.g. SCR spikes), and (2) large overvoltage conditions (2 times normal) that sometimes arise on power lines and persist for a few cycles. The Wanlass Dynamic Filter eliminates both of these harmful transient conditions. The effect of the Wanlass Dynamic Filter on SCR spikes is shown in the unretouched oscilloscope photo on the right. Lower trace shows input wave to Dynamic Filter with 70 volt SCR spike plainly visible. Upper trace shows corresponding output wave from Dynamic Filter with spike eliminated. (Note that the residual low frequency distortion in output wave is also in input wave.) The dynamic filter also eliminates harmful transient overvoltage conditions by means of a "peak clipping" feature which instantaneously (response much less than 1 microsecond) limits output voltage peaks to 185 volts (130 volts rms).



R-1300 PRICES*

VA	BASIC UNIT	UNIT WITH DYNAMIC FILTER	PACKAGE	WEIGHT
500	R-1305 \$300	RF-1305 \$350	19" Rack Mount	25 Pounds
1000	R-1310 \$375	RF-1310 \$475	19" Rack Mount	40 Pounds
2000	R-1320 \$450	RF-1320 \$600	19" Rack Mount	60 Pounds
3000	R-1330 \$575	RF-1330 \$775	19" Rack Mount	75 Pounds

ADDITIONAL OPTIONS:

Voltmeter: \$25.00

* F.O.B., SANTA ANA, CALIFORNIA. PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE. TAXES ADDITIONAL. QUANTITY DISCOUNT SCHEDULE AVAILABLE ON REQUEST.

WANLASS ELECTRIC CO.



R-3100

True RMS Voltage Regulators

POWER CONVERSION EQUIPMENT

0.5% Line-Load-Frequency

R-3100

0.5% True RMS
Voltage Regulators

100-130 VAC
47-63 cps

OPERATION

Type of Regulation
Regulation Techniques

- True RMS
- Peak clipping. Incoming voltage peaks are dissipated across a power transistor (See R-3200)

Control Techniques

- Closed loop control using RMS sensor and zener diode reference

Components

- All solid state

SPECIFICATIONS

Input

100-130 VAC (RMS)
47-63 cps

Output

115 VAC (RMS)
(Can be set 110-120 VAC)

Line Regulation ($\pm 10\%$)

$\pm 0.5\%$

Load Regulation (10% to full load)

$\pm 0.5\%$

Frequency Regulation (47-63 cps)

$\pm 0.5\%$

Power Factor Regulation
(+0.7 to -0.7)

$\pm 0.5\%$

Phase Shift

None

Response Time

10-50 microseconds

Temperature Coefficient

0.025%/°C

Temperature

0°C - 50°C

APPLICATIONS

1. Any true RMS application
2. Photography
3. Lighting
4. Heating
5. Optical

*F.O.B. SANTA ANA, PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE, TAXES ADDITIONAL.

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PRICE LIST

NON-ISOLATED OUTPUT

<u>Model</u>	<u>Volt Amperes</u>	<u>Size (Inches)</u>	<u>Weight</u>	<u>Price*</u>
R-3100/15	15	2-3/4 x 2-3/8 x 3	11.5 oz.	\$ 21.00
R-3100/30	30	2-5/8 x 2-3/4 x 3-5/16	20 oz.	22.50
R-3100/60	60	3 x 4 x 4-1/8	32 oz.	30.00
R-3100/90	90	3 x 4 x 4-1/8	32 oz.	36.00
R-3101	120	3-1/4 x 4-1/4 x 4-1/4	42 oz.	42.00
R-3102	250	5 x 4-7/8 x 9-1/2	6 lbs.	72.00
R-3105	500	6-3/4 x 5-7/8 x 10-7/8	10 lbs.	123.00
R-3107	750	5-1/2 x 5-7/8 x 16	12-3/4 lbs.	165.00
R-3110	1000	6-3/4 x 4-7/8 x 16	16 lbs.	205.50

ISOLATED OUTPUT

<u>Model</u>	<u>Volt Amperes</u>	<u>Size (Inches)</u>	<u>Weight</u>	<u>Price*</u>
R-3100/15I	15	2-11/16 x 3-1/4 x 2-7/8	1-1/2 lbs.	\$ 24.00
R-3100/30I	30	3-7/8 x 4-7/8 x 3-1/2	2-1/2 lbs.	25.50
R-3100/60I	60	4 x 4-7/8 x 4	4-1/2 lbs.	34.50
R-3100-90I	90	4 x 4-7/8 x 4-3/16	4-1/2 lbs.	42.00
R-3101-I	120	4 x 5 x 5-1/2	6-1/2 lbs.	48.00
R-3102-I	250	6 x 6 x 11-3/8	14-3/4 lbs.	79.50
R-3105-I	500	6 x 6 x 13	22-1/2 lbs.	132.00
R-3107-I	750	6-3/4 x 6 x 19-1/2	31 lbs.	176.00
R-3110-I	1000	6-3/4 x 6 x 19-1/2	35 lbs.	217.50

CUSTOM UNITS

Wanlass Electric is quite willing to quote on customized R-3100 regulators having one or more of the following specifications:

1. Other output voltages - 0 to 1000 volts.
We are quite able to regulate higher voltages.
2. Multiple output voltages - several different isolated outputs can be accommodated.
3. Multiple input voltages - designed to accept any one of several input voltage ranges.
4. Multiple input frequencies - any reasonable frequency range can be accommodated.
5. Temperature - the stability and temperature coefficient of the unit can be improved to almost any degree desired.
6. Military specifications - Yes, we can and have done some of these units.

WANLASS ELECTRIC CO.



R-2000

R-2000 VOLTAGE REGULATOR SERIES **POWER CONVERSION EQUIPMENT**

0.5% RMS LINE - LOAD REGULATION

LINE - LOAD -
FREQUENCY
0.5% REGULATOR

100 - 130 VOLTS



The R-2000 is a high quality voltage regulator capable of stabilizing the RMS output voltage within 0.5% under wide variations of line, load, power factor, and frequency (including 45-75 cycles). Based on new magnetic techniques, this rugged unit incorporates closed-loop control including an RMS output voltage sensor and thereby eliminates the problems that historically have plagued open-loop voltage stabilizers. If desired, an average voltage sensor may be substituted for the RMS sensor at no increase in price. As is the case with most Wanlass Regulators, an adjustable output voltage is provided. Meters and remote sensing are available as extra cost options.

SPECIFICATIONS

- | | |
|-------------------------------------|---|
| ■ Line Regulation | 100-130 volts input
± 0.5% for ± 10% volts input variation |
| ■ Load Regulation | ± 0.5% for 10% to full load |
| ■ Output Voltage Adjustable | 110-120 volts |
| ■ Frequency Insensitive | Wide range including 47-63 cps operation |
| ■ Power Factor Insensitive | Typically 1.0 to 0.7 lagging |
| ■ Response | 30-100 milliseconds |
| ■ Operating Temperature | 0-50° C |
| ■ Stability | ± 1/2% after warm up |
| ■ No Zero Load Circulating Currents | Better Efficiency |
| ■ Current Limitation | Inherently Self Limiting |
| ■ No SCR Circuits | No "spikes" |
| ■ Magnetic Techniques | Variable Inductor Element |

*F.O.B. SANTA ANA, PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE, TAXES ADDITIONAL.

2189 SOUTH GRAND AVENUE

SANTA ANA, CALIFORNIA 92705



PHONE
(714) 546-8990

PATENTS PENDING

REGULATION:

Regulation is achieved using an electrically controlled variable inductor. The voltage drop developed across this element constitutes the technique for regulating the output voltage. An RMS (or average) sensor provides the input to the control circuitry which in turn provides appropriate current to control the inductance of the variable inductor.

Using this technique the R-2000 is able to achieve high precision ($\pm 1/2\%$) output voltage regulation under $\pm 10\%$ changes in line voltage and 90% changes in load current. Significantly wider ranges of operation are possible with only slight decreases in operating characteristics.

MULTI-FREQUENCY OPERATION:

Perhaps the most important feature of this line is its multi-frequency operation. Units have been successfully operated over a 45 to 80 cps range. To enhance this feature, no frequency sensitive circuitry or filters are incorporated in the unit. Thus the unit is ideal for:

- (1) interchangeable 50 and 60 cps operation.
- (2) operation in connection with auxiliary power plants having wide frequency variations.

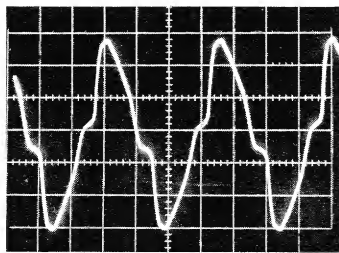


FIG. 1 50 CPS

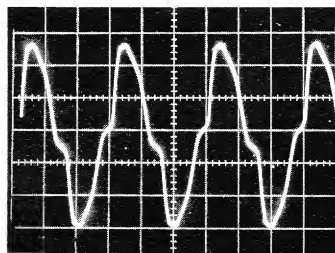


FIG. 2 60 CPS

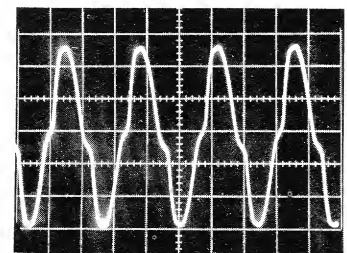


FIG. 3 75 CPS

FIGURE 1 THROUGH 3 SHOW OUTPUT VOLTAGE AT 50, 60, AND 75 CPS.

POWER FACTOR OPERATION:

Due to their closed loop control, these voltage regulators operate over a wide range of power factors. They are ideal for use with motors or other inductive loads.

ADJUSTABILITY:

Although the output voltage adjustment is specified as 110-120 volts (RMS), a significantly greater range is possible with corresponding decrease in operating characteristics.

R-2000 PRICES*

VA	UNIT	PACKAGE	SIZE	PRICE
250	R-2002	(see photo)	5" x 8½" x 9½"	\$125.00
500	R-2005	Rack Mount	19"	\$205.00
1000	R-2010	Rack Mount	19"	\$270.00
2000	R-2020	Rack Mount	19"	\$350.00
3000	R-2030	Rack Mount	19"	\$425.00

OPTIONS:

Meter \$25.00
Remote Sensing — factory quote